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WEAPON SYSTEMS 133A AND B
PROGRAM PROGRESS PRODUCTION MOTORS
STAGE I MINUTEMAN

1 JAN THRU 31 MAR 1967



Thiokol
CHEMICAL CORPORATION
WASATCH DIVISION

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⑨ Contract Status Report. 1 Jan - 31 Mar 67.

Wasatch Division Report
No. 0717-62-0982

⑥ WEAPON SYSTEMS 133A AND B.

PROGRAM PROGRESS PRODUCTION MOTORS
STAGE I MINUTEMAN,

~~1 Jan - 31 Mar 67~~

⑪ 31 Mar 67

Prepared by

THIokol CHEMICAL CORPORATION
WASATCH DIVISION
Brigham City, Utah

⑫ 15 p.

~~Contracts~~

⑮ AF 04(694)-334,
AF 04(694)-500
~~AF 04(694)-524~~
~~AF 04(694)-525~~

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MINUTEMAN Programs

Prepared for

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AIR FORCE SYSTEMS COMMAND
UNITED STATES AIR FORCE
Norton AFB, California

Publications No. 0467-13996

ML (1401261)

FOREWORD

This program progress report was prepared for the period of 1 Jan thru 31 Mar 1967 in compliance with Contracts AF 04(694)-334, ✓ AF 04(694)-500, AF 04(694)-774, AF 04(694)-926, ✓ and US Air Force Ballistic Missile and Military Space Systems Contractor Reports Exhibit 58-1.

The Work Breakdown Structure for Contract AF 04(694)-926 differs from the preceding production programs. For purposes of this report, the work content of projects and tasks determines where each project and task is placed.

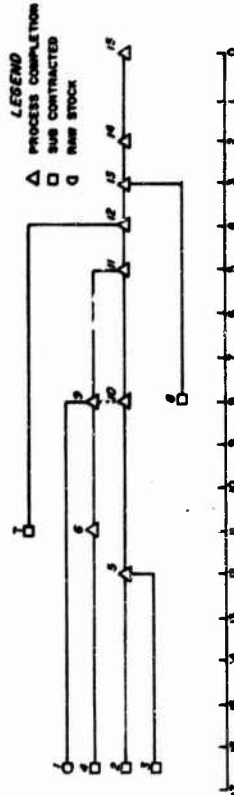
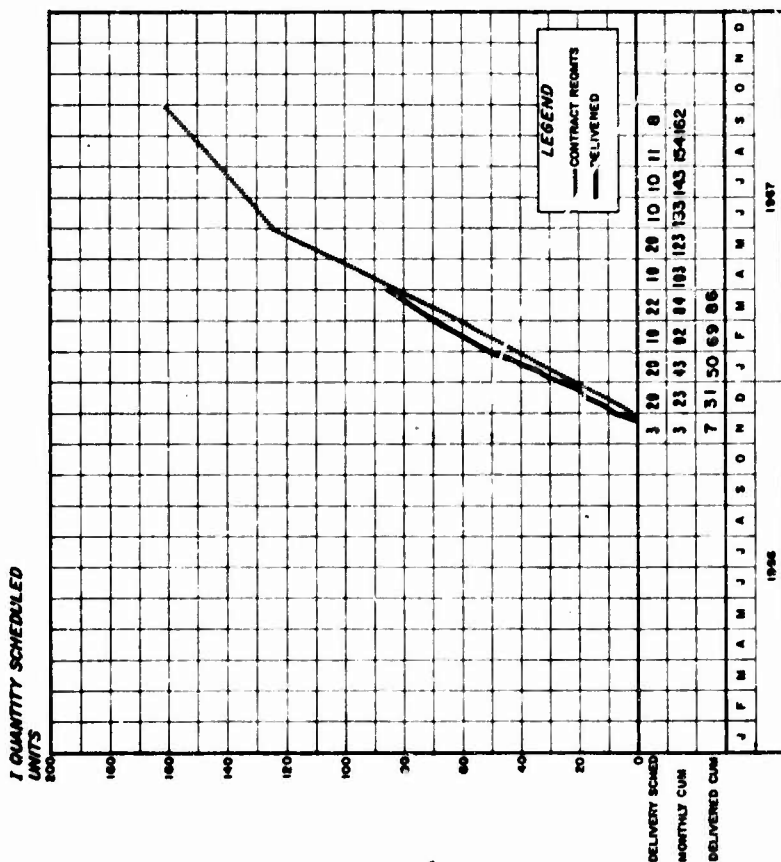
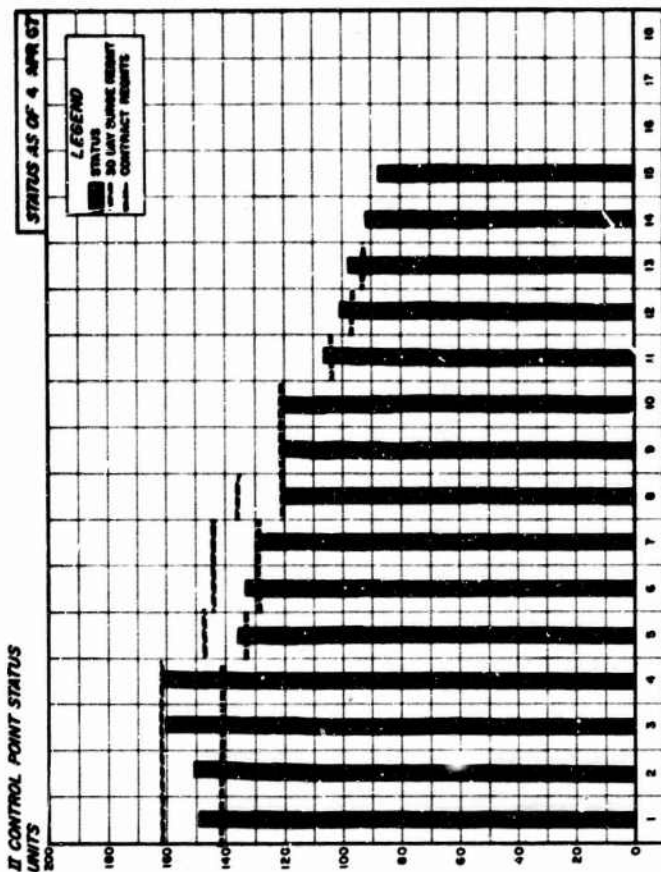
Projects completed before this quarter, or as yet unreleased, are not reported. Reporting of administrative effort is "reporting by exception." Insignificant or routine activity is not reported. Technical effort reported is primarily status reporting.

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PRODUCTION ANALYSIS GRAPH - MINUTEMAN PROGRAM STAGE I MOTOR CONTRACT AF 04(694)-774

0716-60-0895



- II PRODUCTION CONTROL POINTS
1. RECEIVE PROPELLANT RAW MATERIALS
 2. RECEIVE CASE AND CLOSURE
 3. RECEIVE INTERNAL CASE AND CLOSURE INSULATION
 4. RECEIVE BLAST TUBES
 5. START CASE PREPARATION
 6. START CLOSURE PREPARATION
 7. RECEIVE NOZZLE AND NOZZLE COVERS
 8. RECEIVE FINAL ASSY COMPONENTS
 9. LAST MOTOR
 10. O-37 CLOSURE
 11. INSTALL CLOSURE
 12. INSTALL NOZZLE
 13. COMPLETE FINAL ASSY
 14. PRESENT TO A.F.
 15. A.F. ACCEPT

PLANNING AND PROGRAM CONTROL

CONTRACT AF 04(694)-774 (Project 32101)

Program Planning, Scheduling, and Control (Task 01)

The Earned Value system was completely defined; however, the last changes were not fully documented at the end of the quarter. Several meetings were held with representatives of Performance Technology Corporation to finalize requirements. The Planned Value (budget) is being re-established to incorporate the change in motor delivery requirements and program extension.

Photographic Support (Task 03)

Motion and still photographic coverage was submitted for the following events.

1. Static test of M55A1 Stage I motors QA-701, 702, and 703.
2. Receiving inspection, M55A1 Stage I motor case.
3. Installation of leadend insulation, M55A1 Stage I motor.
4. Installation of raceway bracket, M55A1 Stage I motor.
5. Installation of aft case insulation, M55A1 Stage I motor.
6. Case degreasing, M55A1 Stage I motor.
7. Case rounding, M55A1 Stage I motor.
8. Propellant mixing, M55A1 Stage I motor.
9. Installation in casting pit, M55A1 Stage I motor.

CONTRACT AF 04(694)-926 (Project 33101)

Program Planning, Scheduling, and Control (Task 01)

Volume I of the Program Plan was distributed. Effort was initiated to bring this contract under Earned Value control. The new delivery schedule (reduced delivery rate and program extension) was incorporated into the planning.

MOTOR MANUFACTURE

CONTRACT AF 04(694)-774 (Project 32102)

Planning and Control (Task 01)

Revision of the FY-1968 production schedule reduced the manufacturing rate from 20 to approximately 11 motors per month.

Motor Fabrication (Task 02)

Fabrication of 171 motors is required on this project. Nine motors will be tested as QA's and 162 delivered to AF Plant 77. Accomplishments through the quarter are summarized below.

	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Quarterly Cumulative</u>	<u>Cumulative End Last Quarter</u>	<u>Program Cumulative</u>
Contract Required	20	19	22	61	23	84
Actual Thiokol On-Dock	19	19	17	55	31	86
Shipped to AF Plant 77	24	18	19	61	2	63
QA Motors Tested	0	1	1	2	2	4

Quality Assurance Testing (Task 03)

QA-702 and 704 were successfully static tested on 10 February and 19 March, respectively. Final reports for QA-701, 702, and 703 were submitted to BSD. The two SCN's on RIP aft closure segment density requirements were approved in January, following successful static test of QA-702.

CONTRACT AF 04(694)-926 (Project 33102)

Planning and Control (Task 01-01)

The revised production schedule was received during this quarter. This revision extends the contract approximately five months and delays the start date two months.

Motor Fabrication (Task 01-02)

A PWA was released 30 Mar 1967 to cover the effort for manufacture of 180 motors. Nine motors will be static tested and 171 delivered. Processing of the first case is scheduled to begin in June 1967.

CONFIGURATION MANAGEMENT

CONTRACT AF 04(694)-774 (Project 32104)

Configuration Control Support (Task 02)

A summary of change activity involving customer-controlled engineering documentation appears below. The changes include Thicokol-originated, customer-directed updating, plus error corrections.

ECP's Submitted	4
ECP Revisions Submitted	0
ECP's Approved	4
ECP's Disapproved or Cancelled	0
ECP's Pending Approval Action	0
SCN's Submitted	12
SCN's Approved	12
SCN's Disapproved/Withdrawn	0
SCN's Pending	0
Class II Engineering Change Orders	
Approved	32
Pending	0

Configuration Identification Index and Status Accounting (Task 03)

Reporting on this program has been completed on a monthly and bi-monthly basis to the CCB and The Boeing Company for the Configuration Identification Index (AFBSD Exhibit 60-60) and the Configuration Status Accounting (AFBSD Exhibit 60-60A).

Configuration Control Change Board (Task 04)

- a. Ten manufacturing process changes were processed and approved through the Process Change Board. One change was disapproved.
- b. Twenty-five vendor process changes were submitted and approved.
- c. Documentation processed through the Configuration Change Board consisted of the following:

Engineering Change Orders	132
Engineering Change Proposals	5
Specification Change Notices	29
Interface Revisions and Revision Notices	3
Engineering ECS's Verified	56

RELIABILITY

CONTRACT AF 04(694)-774, WING VI (Project 32112)

Reliability Program (Task 01)

At a Reliability Working Group Meeting held with TRW, motor records and scoring were simplified and FTM 454 motor classification was reviewed. The change in classification of this motor is reflected in the TRW Reliability Status Report for the month of January. In this meeting it was also agreed that Wing II demonstration scoring should be discontinued.

There were four Wing VI RIP motors tested during this period. They were FTM 464, FTM 465, QA-703, and QA-704. These tests were all successful. Reliability assessment is provided in the Monthly Reliability and Failure Report.

Configuration Identification Index and Status Accounting (Task 03)

Reporting on this program has been completed on a monthly and bi-monthly basis to the CCB and The Boeing Company for the Configuration Identification Index (AFBSD Exhibit 60-60) and the Configuration Status Accounting (AFBSD Exhibit 60-60A).

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RELIABILITY

CONTRACT AF 04(694)-774, WING VI (Project 32112)

Reliability Program (Task 01)

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Reliability Demonstration of the Safety and Arming Device (Task 02)

Forty-eight safety and arming devices of the KR80000-09 configuration were successfully tested during this period, bringing the total quantity tested to 749 with 0 failures. Assessed reliability is 99.60 percent at 95 percent confidence. Routine demonstration and monthly status reports were issued in accordance with Document MAC-SSAD-6-64.

CASE AND CLOSURE REQUIREMENTS

CONTRACT AF 04(694)-774 (Project 32120)

Case procurement status at the end of the quarter was as follows:

<u>Vendor</u>	<u>On Order</u>	<u>Shipped</u>
General Electric	171	167

CONTRACT AF 04(694)-926 (Project 33102)

Case Requirements (Task 02-01)

<u>Vendor</u>	<u>On Order</u>	<u>Shipped</u>
General Electric	186	13

CONTRACT AF 04(694)-926 (Project 33107)

Case Girth Weld Elimination (CCN-2)

The first long cylinder case (General Electric S/N 405) was successfully hydroburst on 2 Feb 1967. Case internal pressure at burst was 1,142 psig, showing a margin of safety of 21 percent. MINUTEMAN Program requirements for hydroburst per specification TWS-EQ-195A for the case-closure assembly is 1,092 psig. This case was also initially equipped with strain gages and hydrotested to the production proof pressure of 940 psig. The final report on the hydroburst test was completed during this quarter.

Four long cylinder cases were successfully hydrotested, and the final report is being prepared. Incorporation of this long cylinder design into production was completed and the first cases incorporating the change have been delivered.

NOZZLE REQUIREMENTS

CONTRACT AF 04(694)-774, WING VI (Project 32121)

Status of nozzle procurement at the end of the quarter was as follows:

<u>Vendor</u>	<u>On Order</u>	<u>Shipped</u>
ARDE	305	262
Kaiser	379	342

ARDE nozzle deliveries are 43 units behind schedule; all 43 are expected to be shipped in April.

Kaiser deliveries are on schedule.

CONTRACT AF 04(694)-926 (Project 33102)

Nozzle Requirements (Task 02-02)

<u>Vendor</u>	<u>On Order</u>	<u>Shipped</u>
Kaiser	720	First shipment scheduled for April 1967

INSULATION REQUIREMENTS

CONTRACT AF 04(694)-774 (Project 32122)

Component deliveries against this contract are complete, with exception of the graphite billet used in the manufacture of the motor blast tube insert and a few minor components. Based on current delivery projections, all parts will be available to meet motor manufacturing requirements.

The aft closure segment molding material investigation, mentioned in previous quarterly reports, was completed during this reporting period. The investigation concluded with a motor static test and successful performance of aft closure segments produced from material with a density value below previous engineering (specification) requirements. Subsequent to motor performance evaluation, the density parameter was modified to comply with a tolerance range commensurate with the verification segments.

CONTRACT AF 04(694)-926 (Project 33102)

Insulation Requirements (Task 02-03)

Contracts have been placed for all insulation components, and shipments have begun. Part deliveries and schedule projections are in accordance with the motor manufacturing requirement schedule.

ORDNANCE HARDWARE AND TESTING

CONTRACT AF 04(694)-500 (Project 31123) AND CONTRACT AF 04(694)-774 (Project 32123)

Sixty-four KR80000-09 safety and arming devices remain to be delivered from Pelmec.

CONTRACT AF 04(694)-925 (Project 33102)

Ordinance Hardware (Task 02-06)

Under this task, Thiokol is furnishing standardized igniter safety and arming devices to Aerojet, Hercules and OOAMA as GFE items. To date the following allocation has been completed:

Aerojet	48
Hercules	39
OOAMA	115

Ordinance Testing (Task 02-07)

Thiokol has completed lot acceptance testing of stub-stats and fuses furnished to the safety and arming device vendor as GFE items. One lot of squibs, also furnished GFE, has been rejected.

CONTRACT AF 04(694)-926 (Project 33107)

Safety and Arming Device Simulators (Task 02-00)

The design package for the standardized igniter safety and arming device simulator is presently being updated to incorporate all changes to the KR80000 device. The new simulator will be identified as KR81000-02 and will simulate the KR80000-09 device. Thiokol will furnish 13 of the new simulators to motor associate contractors as GFE.

RAW MATERIAL REQUIREMENTS

CONTRACT AF 04(694)-774 (Project 32124)

All major raw materials have been delivered and accepted for use. Delivery of miscellaneous raw materials and standard quality control retesting of raw materials will continue until the Third Quarter, 1967.

Raw Material Standardization (Task 02)

Standardization of raw materials for use in the three propellant systems is as follows.

<u>TP-H1011 Evaluation</u>	<u>Status</u>	<u>Motors Loaded or Start Date</u>
406	Complete	16
430	Complete	35
431	Complete	35
432	Complete	In use
433	Complete	11 Apr 1967
434	50% Complete	6 Jul 1967

Propellant from Evaluation 406 was used in Contract AF 04(694)-500 as well as this project. Approximately 15 motors will be loaded from Evaluation 434 with the remaining 19 motors to be loaded in Contract AF 04(694)-926.

<u>TP-H1043 Evaluation</u>	<u>Status</u>	<u>Closure Loading Start Date</u>
455	Complete	In use
495	Complete	16 May 1967

<u>TP-H1016 Evaluation</u>	<u>Status</u>	<u>Igniter Loading Start Date</u>
440	Complete	In use

Evaluation 440 will complete igniter loadings through October 1968.

CONTRACT AF 04(694)-926 (Project 33102)

Raw Materials Procurement (Task 08)

Purchase Orders have been placed for all major raw materials. Delivery of raw materials for TP-H1011 propellant is scheduled as follows:

<u>Evaluation</u>	<u>Delivery Date</u>
480	10 Apr 1967
481	20 Jun 1967
482	20 Sep 1967
483	20 Dec 1967
484	25 Mar 1968

Raw materials for TP-H1043 and TP-H1016 propellant will be transferred from Contract AF 04(694)-774 in the Third Quarter, 1967. A backup evaluation for TP-H1043 propellant will be ordered during the Second Quarter, 1967.

Raw Materials Standardization (Task 09)

The initial propellant requirements for TP-H1011, TP-H1043, and TP-H1016 propellants will be satisfied with Material Evaluations 434, 495, and 440, respectively, from Contract AF 04(694)-774. The first TP-H1011 standardization to be conducted under this project will be Evaluation 480 during the Second Quarter, 1967.

MISCELLANEOUS HARDWARE REQUIREMENTS

CONTRACT AF 04(694)-500 (Project 31125)

OPT Procurement (Task 02)

Procurement from CEC is complete. Wiancko has six units to deliver. Attempts are being made to cancel these six units from the contract.

CONTRACT AF 04(694)-774 (Project 32125)

OPT Procurement (Task 02)

<u>Vendor</u>	<u>On Order</u>	<u>Shipped</u>
CEC	175	171

CEC will complete delivery in April.

CONTRACT AF 04(694)-926 (Project 33102)

Miscellaneous OPT Hardware Requirements (Task 02-04)

<u>Vendor</u>	<u>On Order</u>	<u>Shipped</u>
CEC	180	47

Vendor is on schedule.

PRE-OPERATIONAL SUPPORT

CONTRACT AF 04(694)-774 (Project 32128)

Production Support Repair Plan (Task 02)

Approval of the Production Support Repair Plan was received via BSD/BSRKP-1.

TECHNICAL MANUALS, DOCUMENTATION, AND SUPPORT

CONTRACT AF 04(694)-774, WING VI (Project 32129)

Source Data (Task 01)

CCN authorization was received to begin periodic review of T.O. 11A17-1-100-21. All other source data items were reviewed.

Technical Manual Progress Reports (Task 02)

Reports were submitted monthly as required by MCMSP Exhibit 1-3.

CFAE/CFAE Notices (Task 03)

CFAE Notices 107 thru 118 were submitted during this period. OOAMA and BSD have given technical approval of all outstanding CFAE Notices but CCN coverage has not been received.

Stationary Handling Device (Task 11)

A revision to the handling device technical order was submitted during this reporting period.

Overhaul of Safety and Arming Device (Task 12)

A revision to the safety and arming device technical order was submitted during this reporting period.

Hill AFB Range Manual (Task 13)

The post-publication review of the HAFB Range Manual was conducted on 27-28 Feb 1967. This review will result in a major change to the technical order.

Work Statement (Task 17)

The work statement identifying all effort associated with incorporating OOAMA supplied technical data for motor, nozzle and safety and arming device overhaul is in process.

MATERIEL DIVISION SUPPORT

CONTRACT AF 04(694)-500 (Project 31130)

Materiel Division Support is now 99 percent complete.

CONTRACT AF 04(694)-774 (Project 32130)

Materiel Division Support is 85 percent complete.

CONTRACT AF 04(694)-926 (Project 33105-08)

Materiel Division Support is 12 percent complete.

PRODUCTION SUPPORT PROGRAMS

CONTRACT AF 04(694)-774 (Projects 32331 thru 32335)

The individual reports for all of the above projects were completed this quarter. A final report containing all of the above project reports combined into three volumes will be completed in April 1967 and distributed to BSD and TRW.

DEPOT MAINTENANCE GROUND EQUIPMENT

CONTRACT AF 04(694)-334 (Project 30581)

Four bogies were reworked and returned to OOAMA, making a total of 13 reworked to date with 7 more scheduled for rework.

CONTRACT AF 04(694)-500 (Project 31381)

Procurement and delivery of long leadtime items for the universal cradle continued. Of the 1,308 items involved, 1,167 had been shipped to OOAMA as of 31 Mar 1967. Unexpected difficulties in casting the end fittings of the 8U100070-01 support band at the casting vendor will extend the final completion date of this effort to June 1967.

CONTRACT AF 04(694)-774 (Project 32261)

Fabrication effort continued on 11 items of Wing VI configuration. Engineering demonstration and Air Force buyoff of these items are scheduled for late April and early May 1967. Five of these items will be used to support the RIP Nozzle Verification and Validation Program. Six items will be used to support the Safety and Arming Verification and Validation Program.

SPARE PARTS AND LOGISTICS SUPPORT

CONTRACT AF 04(694)-334 (Project 30582)

Additional depot tooling spares orders were received. Deliveries are scheduled through June 1967.

CONTRACT AF 04(694)-500 (Project 31380)

AVE spares delivery effort has been completed; however, this project remains open pending transfer of three delayed procurement motors (1U32300-28) to Contract AF 04(694)-774.

CONTRACT AF 04(694)-774

AVE Spares Hardware (Project 32580-02)

A total of 35 government orders for AVE hardware spares were in process during this period. Hardware is scheduled for delivery through September 1967.

DMGE Spares Hardware (Project 32582)

Logistics support documentation is under way in anticipation of source coding conferences in support of DMGE spares. Source coding conferences are tentatively scheduled for late May or early June 1967.